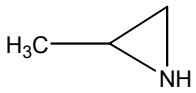
2-METHYLAZIRIDINE (PROPYLENIMINE)
CAS No. 75-55-8
First Listed in the *Fourth Annual Report on Carcinogens*



CARCINOGENICITY

2-Methylaziridine (propylenimine) is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC V. 71, 1999; IARC V.9, 1975; Weisburger et al., 1981; IARC S.7, 1987). When administered in water by oral gavage or in the diet, 2-methylaziridine induced leukemia and intestinal adenocarcinomas in male rats, mammary adenocarcinomas in female rats, and gliomas and squamous cell carcinomas of the ear canal in rats of both sexes (Weisburger et al., 1981; IARC V.9, 1975).

There are no adequate data available to evaluate the carcinogenicity of 2-methylaziridine in humans (IARC V.9, 1975; IARC S.7, 1987).

PROPERTIES

2-Methylaziridine is a colorless, oily liquid, with an odor similar to that of aliphatic amines. It fumes in air, is flammable, and is miscible with water and soluble in ethanol. 2-Methylaziridine polymerizes easily and hydrolyzes in aqueous or hydrochloric acid solutions to give methylethanolamine. When heated to decomposition, it emits toxic fumes of nitrogen oxides (NO_x).

USE

2-Methylaziridine is apparently used in the United States exclusively as an intermediate whose derivatives are used in the paper, textile, rubber, and pharmaceutical industries (Sax, 1987). Its main use is in the modification of latex surface-coating resins to improve adhesion. Polymers modified with 2-methylaziridine or its derivatives have been used in the adhesive, textile, and paper industries because of the substantive bonding of imines to cellulose derivatives. 2-Methylaziridine has been used to modify dyes for specific adhesion to cellulose, and derivatives have been used in photography, gelatins, and synthetic resins. In the oil-additive industry, this chemical and its derivatives have been used as modifiers for viscosity control, high-pressure performance, and oxidation resistance. Other applications include use in flocculants in petroleum refining, as a modifier for rocket propellant fuels, in fiber modification, and in imine derivatives for use in medicinal and agricultural chemicals (IARC V.9, 1975).

PRODUCTION

The Chem Sources USA directory identified two suppliers of 2-methylaziridine in 1986 (Chem Sources, 1986). The 1979 TSCA Inventory identified one producer of 2-methylaziridine in 1977, with a reported production of 500,000 lb (TSCA, 1979). No other production, import, or export data were available.

EXPOSURE

The primary routes of potential human exposure to 2-methylaziridine are inhalation, ingestion, and dermal contact. Due to its volatility, potential exposure could occur during production, packaging, or use of substances made with 2-methylaziridine. The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 20 people were potentially exposed to 2-methylaziridine in the workplace in 1970 (NIOSH, 1976). The ACGIH has set a threshold-limit value for exposure to 2-methylaziridine in the workplace at 2 ppm as an 8-hr time-weighted average (TWA) (ACGIH, 1986). ACGIH has noted the potential contribution to overall exposure by the cutaneous route including mucous membranes and eyes, either by airborne, or more particularly, by direct contact with the substance. Potential consumer exposure could occur as a result of handling products coated with 2-methylaziridine or its derivatives. The Toxic Chemical Release Inventory (EPA) listed one industrial facility that produced, processed, or otherwise used 2-methylaziridine in 1988 (TRI, 1990). In compliance with the Community Right-to-Know Program, the facility reported releases of 2-methylaziridine to the environment which were estimated to total 500 lb.

REGULATIONS

EPA regulates 2-methylaziridine under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and Superfund Amendments and Reauthorization Act (SARA). EPA established a final reportable quantity (RQ) of 1 lb for 2-methylaziridine under CERCLA. 2-Methylaziridine is subject to reporting/recordkeeping requirements under RCRA and SARA. Also under SARA, EPA requires that emergency response plans be prepared if the threshold planning quantity of 10,000 lb is reached. OSHA regulates 2-methylaziridine under the Occupational Safety and Health Act (OSH Act). OSHA standards for occupational exposure to skin contaminants require that an employee's exposure to 2-methylaziridine not exceed the permissible exposure limit (PEL) of 5 mg/m^3 (2 ppm) as an 8-hr TWA in air. OSHA also regulates 2-methylaziridine under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-79.